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ABSTRACT

The purpose of this study was to determine if the relationships among alphabet skills, auditory discrimination, and visual discrimination for five-year-olds prior to kindergarten were similar to those found in studies of subskills of first grade children. The sample consisted of 23 middle class nursery school children between the ages of 5.1 and 5.7 years. Five selected subtests of the Comprehensive Tests of Basic Skills were used to measure the intercorrelations among three subskill areas--alphabet, visual, and auditory discrimination--through the testing of letter forms, letter names, letter sounds, visual discrimination, and sound matching. The three subskill areas showed moderate intercorrelations of roughly equal type and magnitude to those found for first graders. Further research is needed to determine the variables that are not accounted for in this study. Other reading measures should be examined to determine their relationship to subsequent reading achievement. (Author/MAI)

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INTERRELATIONSHIPS AMONG SELECTED ALPHABET, VISUAL AND AUDITORY DISCRIMINATION TESTS FOR NURSERY SCHOOL CHILDREN

A THESIS

SUBMITTED TO THE FACULTY

OF THE GRADUATE SCHOOL OF EDUCATION

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CHAPTER I

THE PROBLEM

Pre-school reading has been a controversial area for the last few decades. It was felt that the primary purpose of kindergarten was to provide the experiences which prepare pupils for reading in the first grade. With the developing concepts of reading readiness came the attempts to measure readiness in the form of reading readiness tests in order to clarify the skills attained and to predict reading success even though the predictive validity tends to be low (.6). Throughout the 1930's, 40's, and 50's, educators continued to be concerned with maturation, mental age, and the assessment of readiness through reading readiness tests.

The 1960's and 70's have been years focusing on the identification and teaching of specific sets of subskills in reading. Early childhood education has been receiving more emphasis and more children have been coming to kindergarten already reading. (Durkin, 1964).

Purpose

The purpose of this study was to provide extended

validity data on the relationships of selected skill areas purportedly important in first grade as they apply to a pre-kindergarten sample. The three skills areas that were reported in the literature were alphabet skills, auditory discrimination, and visual discrimination.

More specifically, the questions for which answers were sought are the magnitude and significance of the inter-correlations between the following skills areas and the specific tests which assess these skills:

Skills Area	Variable
Alphabet Skills	CTBS 1 - Letter Forms CTBS 2 - Letter Names CTBS 4 - Letter Sounds
Visual Discrimination	CTBS 5 - Visual Discrimination
Auditory Discrimination	CTBS 6 - Sound Matching

In the studies reviewed, the auditory, visual, and alphabet variables were only utilized in first grade reading achievement.

The significance of the study lies in the attempt to provide additional information about the sub-sets of skills. These skills have been found to be important for grade 1, but presently only presumed to be contributing to pre-K development of readiness. This study represents an initial attempt to provide data extending validity downward to the pre-K level. No study was found which attempted to deter-

mine correlations between auditory, visual, and alphabet variables as they apply to 5 year olds prior to entering kindergarten. Hence, this study attempted to incorporate the same kinds of variables for the preschooler.

Definition of Terms

1. Preschooler: That child who has the chronological age of five years and who has not entered kindergarten.
2. Auditory Discrimination: Sound Matching subtest of the Comprehensive Tests of Basic Skills; also known as CTBS 6.
3. Visual Discrimination: The Visual Discrimination subtest of the Comprehensive Tests of Basic Skills; also known as CTBS 5.
4. Alphabet Skills: Letter Forms subtest of the Comprehensive Tests of Basic Skills; also known as CTBS 1; Letter Names, CTBS 2; and Letter Sounds, CTBS 4.

Limitations of This Study

Because this study involved such a small group of children with one socio-economic group, it may not apply generally to all populations.

Another limitation of this study is the fact that all the children in the sample experienced one to two years in nursery school. Although nursery school is concerned with social development, the influence on reading skills cannot be determined nor how the results apply to children who have not been to nursery school.

The tests used were designed for children in kindergarten, not nursery school. All the children in the sample were in kindergarten in September, 1976, four months after the testing, so using the K.0 level of the test was quite close to the actual kindergarten level since there were no tests appropriate for pre-kindergarteners.

CHAPTER II

REVIEW OF THE LITERATURE

The research literature related to alphabet, auditory, and visual discrimination measures of reading for preschool children is very limited. After searching the journals and indexes, it became evident that this is primarily an untapped field in reading as it related to careful research and valid studies. The Education Index (1930-1977), Current Index to Journals in Education (1969-1977), Reader's Guide to Periodical Literature (1950-1977), Child Development Abstracts (1930-1977), Reading Research Quarterly (1965-1977), The Reading Teacher (1956-1977), and card catalogs of libraries were searched. The ERIC system, Research in Education (1956-1977), and Dissertation Abstracts (1970-1977) were also checked. In addition, several texts on reading instruction were also consulted.

Two approaches related to early reading emerged from the literature search:

1. Speculations about the kinds of variables that may be important in predicting early reading success;

2. Studies of auditory, visual, and alphabet measures related to first grade reading achievement. These studies

pertained only to particular sets of variables such as auditory discrimination but no study examined performance across variables.

Speculations About Relevant Variables

Spache and Spache (1977) offer the most pertinent and succinct summaries of the speculations about the areas that might pertain to readiness. Of the measures discussed, all related to the kindergarten child and reading readiness rather than the acquisition of specific reading skills.

After analyzing potential areas that relate to reading, they noted that age, intelligence, sex, physical development, and language in general for normal children have very little significance for reading readiness. Visual variables still need to be researched and defined as they relate to reading. After examining all the above variables, Spache and Spache (1977) concluded that auditory discrimination was the most important measure related to reading readiness. However, because reading programs and the kinds of auditory discrimination tests differ in the skills being evaluated, it was difficult to determine the specific relationship auditory discrimination had to reading readiness.

Visual, Alphabet, and Auditory Variables

Barrett (1965a) analyzed selected studies focusing

on the relationship of visual discrimination and first grade reading. He found that the visual discrimination and knowledge of letters was more significant to reading than letter matching or letter matching from memory, with letter matching and word matching relating equally to reading achievement. Barrett also noted that visual discrimination and letter knowledge was better than word matching as predictors of first grade reading.

Barrett (1965b) analyzed another aspect of visual discrimination which was the non-verbal discrimination of pictures and geometric designs. The predictive values of pictures and geometric designs could not be reported by Barrett since the value of non-verbal discrimination tasks may depend on the complexity of the visual-motor abilities required by the test items. In the review of the literature, Barrett surmised that discrimination of letters and discrimination of words as predictors of reading as well as verbal and non-verbal visual discrimination gave mixed results as predictors of reading achievement.

Barrett concluded that there were no visual discrimination tests available which would yield the most valuable and precise information for predicting early reading achievement.

Chall (1967) found that knowing the names of letters before learning to read helps a child in the beginning stages of learning to read whether he learns from an approach emphasizing code or meaning.

Dykstra (1968) found letter-name knowledge to be the best predictor of first grade reading. Factors such as mental age, auditory and visual discrimination, and socio-economic status contributed little in predicting first grade reading achievement.

Ohnmacht (1969) compared the contribution toward reading achievement made by letter names and letter sounds. Three instructional groups were utilized. Group A was taught letter names and then sight words; Group B was taught the letter names and letter sounds and then sight words; and Group C was taught sight words first, then the names and sounds of the letters. The most significant acquisition of word knowledge and word discovery was gained by Group B. Comprehension was better in Groups B and C over Group A, but there was no significant difference between Group B and C. In children whose readiness was below average, the methods used in Group A scored higher for word perception. For word knowledge, word discovery, and word perception for average children, Group B again scored significantly higher for reading acquisition. It was concluded that learning

the letter names and sounds together was superior to only names or only whole sight words for reading acquisition.

Wylie (1969) summarized similar findings but carried the research a step further to discover the contribution of letter name knowledge toward phonics. He reported that the sooner a child learns the letter names, the greater his achievement in reading. Letter name knowledge carried over to the learning of letter sounds by serving as a background for phonics as an important element in the accurate perception of word structure and building a large sight vocabulary. He concluded by stating that letter names are a child's first phonics learning.

Johnson (1970) reported that instruction in letter names resulted in superior letter name knowledge but not in greater vocabulary or comprehension for first grade boys and girls prior to formal beginning reading instruction.

Whisler (1974) conducted visual memory training for 295 first grade children to determine its effects on reading. She found that the closer the visual discrimination task is to the reading task, the more valuable the activity is in developing reading ability.

Dykstra's (1966b) review of the literature about auditory discrimination found that there have been several studies comparing "good" and "poor" readers in auditory

discrimination skills. It appeared that auditory discrimination was significantly related positively and consistently to reading depending on the ability of the reader. However, the different samples of population studied led to different conclusions from significant correlations to no relationship to reading. It was established that age did not appear to be a factor when auditory discrimination skills were related to reading or when reading begins.

Dykstra (1966a) also conducted an investigation of the relationship between auditory discrimination and reading with 632 first grade boys and girls. He found a significant difference between the sexes in readiness for reading, with the girls superior in auditory discrimination. Only two out of the seven auditory discrimination tasks made significant contributions to predicting reading and these two measures did not differentiate between boys and girls. These two measures were the discrimination of ending sounds and pronounciation. Girls also performed significantly better in rhyming, making auditory discriminations, and using context and auditory clues. Girls were significantly superior to boys in reading achievement after one year of instruction and more easily learned these skills than did boys.

Dykstra reported that auditory discrimination tests

alone could not predict reading achievement although ability to make auditory discriminations and intelligence were found significant to reading for first grade boys and girls as a group rather than for individuals. He concluded that auditory discrimination batteries were not necessary to administer for the prediction of reading in individual children since he found such low relationships between each auditory discrimination task.

Evans (1969) summarized some findings on the relationship auditory and auditory-visual integration skills have to reading. Inadequate auditory acuity was considered one of the less frequent causes of reading disability. The ability to discern initial consonant sounds, rhyming, and final consonants, however, was significantly superior in reading vocabulary development. Auditory discrimination skills were related to reading achievement to a moderate degree at all school ages especially when good and poor readers were compared. Poor readers had twice as much difficulty in reaction time in shifting from one sense modality to another. Perceptual factors were found significantly correlated to initial acquisition of reading for early readers by second grade and older, perceptual factors were not significant. Evans concluded that auditory-visual skills are moderately correlated with reading achievement.

Summary

It has generally been found that the most important variable for first grade reading is knowledge of letter names. There were mixed results for visual and auditory discrimination skills which ranged from moderate to low relationships to reading achievement.

There was no study, however, that attempted to determine relationships across the areas of alphabet skills, auditory, and visual discrimination for five year old children.

CHAPTER III

PROCEDURES

For convenience, this chapter will be organized around the following main topics: Sample, Comprehensive Tests of Basic Skills, Administration of Tests, and Treatment of the Data.

Sample

Three nursery school classes were chosen in one nursery school and the teachers gave class time for the administration of reading tests to those children who were five years old on or before March 30, 1976. The age requirement yielded a sample of 23 middle-class children consisting of 9 girls and 14 boys. The children's I. Q.'s ranged from 91 to 158 on the Slosson Intelligence Test. All of the children in the sample entered kindergarten in September, 1976. The children were in nursery school classes for 4 to 5 year olds who would be in kindergarten the following school year. These classes followed the curriculum guide provided by the nursery school. The curriculum did not provide for teaching reading skills such as phonics or sight word recognition or letter recognition

or letter writing. The emphasis of the nursery school was on play and development of the self-image and the social development of the child.

Comprehensive Tests of Basic Skills

In the search for a suitable instrument, this test was specifically designed for five year olds as opposed to other tests for first grade. Selected subtests from the Comprehensive Tests of Basic Skills (CTBS) battery were chosen to evaluate the children's reading skills because it was designed to test five year old children as specifically designated in the manual. Further, the CTBS tests tap similar variables reviewed and applied to first grade.

The validities and the reliabilities for the CTBS/S, Level A, have not been reported in the Technical Manual and were not yet available from McGraw-Hill. Level A was designed to be a pre-reading test and assumed minimum experience with school activities. Level A consisted of eight subtests for the grade range of K.0 - 1.3. Level A was developed with Levels B and C in 1971. Test items were written by kindergarten teachers in cooperation with curriculum and test specialists. All the items that were chosen for the test met the content criteria for this test

design, had a level of difficulty appropriate for the designated grades and ages, had point-biserial correlation coefficients greater than .20, and contributed to the reliability of the test.

The overall objectives of CTBS/S are classified under five broad intellectual processes developed by Bloom (1956): Recognition, Translation, Interpretation, Application, and Analysis. At this Level A, it was not possible for all of the subtests to encompass the broad range of intellectual processes but some of the tests did include most of the higher processes of thought.

Of the eight subtests available for use in Level A, only five were used. The subtests included under the Alphabet Skills area were: Letter Forms (CTBS 1), in which the child matched capital letters with the corresponding lowercase letter; Letter Names (CTBS 2), where the child marked the letter which the examiner said; and Letter Sounds (CTBS 4), which tested initial sounds of words, including consonant sounds and long and short vowel sounds. The child chose one out of three lowercase letters which represented the sound at the beginning of the word said by the examiner.

The Visual Discrimination skills area was tested by CTBS 5, Visual Discrimination, which consisted of matching

a visual stimulus with one out of four answer choices. The items were either shapes, letters, or words.

The Auditory Discrimination skills area was tested with Sound Matching, CTBS 6, in which the child indicated whether the words said by the examiner were the same words or different words. Of the 28 pairs of words, 9 were the same, 4 required differentiating medial vowel sounds, 4 initial consonants, 5 final consonants, and 6 blends and digraphs.

Administration of Tests

The five subtests of the CTBS/S, Level A, were administered in small group sessions during the children's time in nursery school.

Treatment of the Data

Utilizing the Statistical Packaging for Social Sciences (SPSS), frequencies, means, standard deviations, and simple order Pearson correlations were generated at the Center for Computer and Information Services at Rutgers University.

CHAPTER IV

FINDINGS AND DISCUSSION

This chapter presents the findings and the discussion of the intercorrelations of five of the subtests of the Comprehensive Tests of Basic Skills.

The discussion attempts to understand the relationships and find sufficient explanation for the results of this study in relation to the literature.

Findings

Table 1 shows the means and standard deviations of selected subtests of the Comprehensive Tests of Basic Skills. On the Letter Forms subtest, the mean was 11.35 with a range of 3 to 18. The mean for Letter Sounds was 10.35 with a range of 4 to 18 for 21 items. The Visual Discrimination subtest had a mean score of 11.26 with a range of 4 to 17 for 18 items. There was a high level of percent correct for two of the subtests, Letter Names at 86% and Sound Matching at 82%. For Letter Names, the mean was 16.26 with a range of 5 to 19 for 19 items. The mean for Sound Matching was 22.87 and the range was 9 to 28 for 28 items. The table also shows that these two sub-

TABLE 1

MEANS AND STANDARD DEVIATIONS OF SELECTED SUBTESTS,
COMPREHENSIVE TESTS OF BASIC SKILLS
(N = 23)

Test	Items	Mean	S.D.	Range	Avg. % Correct
CTBS 1 - Letter Forms	18	11.35	5.06	3-18	63
CTBS 2 - Letter Names	19	16.26	3.83	5-19	86
CTBS 4 - Letter Sounds	21	10.35	4.02	4-18	49
CTBS 5 - Visual Discrimination	18	11.26	3.79	4-17	63
CTBS 6 - Sound Matching	28	22.87	5.87	9-28	82

tests have high levels of correct scores.

Table 2 shows the intercorrelations of the five subtests. Of the ten intercorrelations calculated, eight statistically significant at the .05 level. Letter Forms correlated to Letter Names .59, with Letter Sounds at .56, and with Visual Discrimination at .61. Letter Names correlated with Letter Sounds at .48 and with Visual Discrimination at .60. In addition, Letter Sounds correlated with Visual Discrimination at the .67 level and with Sound Matching at .46 which also correlated with Visual Discrimination at .44.

The two correlations not statistically significant were Letter Forms and Letter Names each with Sound Matching.

Table 3 shows an array of these correlations in the order of absolute magnitude from a high to a low correlation. The table also shows the amount of variance (in percent) accounted for by the two correlated subtests. The highest correlation was Letter Sounds with Visual Discrimination at .67 with 45% of the variance accounted for. The lowest of the statistically significant correlations was Visual Discrimination with Sound Matching at .44 and 19% variance accounted for leaving most of the variance to be accounted for in each of the eight correlations.

TABLE 2

INTERCORRELATIONS FOR SELECTED CTBS SUBTESTS
(N = 23)

Subtest	CTBS 1	Alphabet CTBS 2	CTBS 4	Visual CTBS 5	Auditory CTBS 6
CTBS 1 - Letter Forms		.59*	.56*	.61*	-.21
CTBS 2 - Letter Names			.48*	.60*	.34
CTBS 4 - Letter Sounds				.67*	.46*
CTBS 5 - Visual Discrimination					.44*
CTBS 6 - Sound Matching					

*Significant at the .05 level. Correlations must be .413 to be significant at the .05 level of confidence.

TABLE 3

STATISTICALLY SIGNIFICANT CORRELATIONS
AND VARIANCE ACCOUNTED FOR BY THE
RESPECTIVE CORRELATIONS
(N = 23)

Subtests	Correlation	Variance (%)
Letter Sounds with Visual Discrimination	.67	45
Letter Forms with Visual Discrimination	.61	37
Letter Names with Visual Discrimination	.60	36
Letter Forms with Letter Names	.59	35
Letter Forms with Letter Sounds	.56	31
Letter Names with Letter Sounds	.48	23
Letter Sounds with Sound Matching	.46	21
Visual Discrimination with Sound Matching	.44	19

Discussion

On the basis of this investigation, some observations can be made concerning the three skill areas related to reading. The three subtests pertaining to Alphabet skills are statistically related among themselves for five year olds. This result is essentially the same finding for first grade as shown by Ohnmacht's (1969) study relating Letter Names and Letter Sounds.

In addition, all three alphabet subtests were significantly related to Visual Discrimination. This is in general agreement with Whisler (1974) who found that the closer the Visual Discrimination task is to the reading task, the more valuable Visual Discrimination is in developing reading ability. This finding is consistent with findings for five year olds as well as for first grade children.

However, for five year olds, Letter Sounds has a higher correlation with the Visual Discrimination task than Letter Forms and Letter Names which at the younger age level have essentially the same magnitude in their relationship to Visual Discrimination. Barrett's (1965) study of Visual Discrimination had lower correlations (.33, .39) than this investigation; however, because of differences in size of sample, type of analyses and type

of task, it is difficult to draw comparisons.

Examination of the tasks involved in the tests suggests an explanation. Although the tests purport to test Letter Sounds, the actual items involve a mixture of the three subskills categories examined. For example, the child's tasks would be to circle one of three letters associated with a picture after the examiner named the picture. In this way the child needed to draw upon his knowledge of Letter Forms as well as Letter Sounds. The relationship of Auditory Discrimination to the Alphabet and Visual Discrimination skills for five year olds is essentially of the same magnitude for first graders which was moderate to low (Dykstra 1966). Upon closer examination of the Auditory Discrimination score, however, there was no statistically significant correlation between Sound Matching and Letter Names, perhaps due to the high level of mastery the five year olds exhibited on the two subtests as revealed by the percentage of correct answers. Perhaps different scores with more of a range would lead to different results in the correlations.

No one subtest accounts for more than 45% of the variance. The moderate degree of intercorrelation of subtests suggests the difficulty of clear interpretation of subtest results. Subtests are neither uniquely distinct nor highly intercorrelated. Thus, the relationships

found here are not conclusive by themselves, yet the relationships among the three variables for five year olds appear to parallel those correlations found in many first grade reading studies.

CHAPTER V

SUMMARY AND CONCLUSIONS

Twenty-three five year old children participated in the study in the spring of 1976. Five subtests of the Comprehensive Tests of Basic Skills, Level A, were used to test the children in order to determine relationships among three variables of reading for this age group. The main question asked in this study was if there would be a similar relationship among Alphabet, Auditory, and Visual Discrimination skills for five year olds as there is at the first grade level.

Conclusions

This study led to the conclusion that there is a statistically significant relationship among Alphabet, Auditory, and Visual Discrimination variables for five year olds. Visual Discrimination skills and Alphabet skills were the most significantly related with Auditory Discrimination skills being moderately important. These skill areas had relationships of the essentially same magnitudes for five year olds as for first graders. More of the variance needs to be explained than was accounted

for in this study.

Suggestions for Further Research

Although several studies have examined first grade reading, there are none found that have investigated reading variables prior to kindergarten or first grade. Research is needed to determine the variables that are not accounted for in this study. More research should be undertaken using other reading measures in order to determine the educational significance of these measures especially as they relate to subsequent reading achievement.

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